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NATIONAL SAFETY INSTRUCTION

UK BP/SE/NSI 15 BRUSH GEAR OF HIGH VOLTAGE ROTATING MACHINES

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BRUSH GEAR OF HIGH VOLTAGE ROTATING MACHINES

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1 SCOPE

This National Safety Instruction applies the principles established by the Safety Rules to achieve **Safety from the System** for the personnel working on the brush gear of **High Voltage (HV)** rotating machines. The work can be done with the machine at rest, on load, on barring gear or on rundown from load.

2 DEFINITIONS

Terms printed in bold type are as defined in the Safety Rules.

3 EQUIPMENT IDENTIFICATION

Equipment on which work is to be carried out must be readily identifiable. Where necessary a means of identification must be fixed to it which will remain effective throughout the course of the work.

4 DANGERS

The main **Dangers** to personnel working on brush gear can arise from

- electric shock or burns
- contact with rotating parts.

5 BRUSH GEAR WORK

- 5.1 Brush gear work should where reasonably practicable be carried out with the machine at rest.
- 5.2 When the work is carried out with the machine at rest, the machine should be **Isolated, Points of Isolation** established and a **Permit for Work or Sanction for Work**, as appropriate, must be issued.
- 5.3 Where the brush gear is within an enclosed compartment, the compartment must be thoroughly **Vented** to ensure all flammable or toxic gases have been removed, before entry is allowed. Where entry is required to a compartment that is normally filled with hydrogen the **Senior Authorised Person** must follow UK BP/SE/NSI 18 Hydrogen Filled Machines or in the case of another gas, the specific procedure for that machine, to ensure safe access.
- 5.4 Where it is not reasonably practicable for the work to be carried out with the machine at rest, a **Senior Authorised Person** must assess the conditions under which the work is to be carried out. This could include giving permission for the work to be carried out with the machine rotating on load, on barring gear or on rundown from load.

6 WORK WITH THE MACHINE ON LOAD

The following precautions must be taken when work is to be carried out on brush gear with the machine on load

- 6.1 The Automatic Voltage Regulator must be taken out of service and the machine excitation changed to hand control. The excitation must be adjusted to ensure that the voltage on the brush gear is as low as is reasonably practicable during the period of work
- 6.2 Any other **Equipment** connected to the excitation circuit which could give rise to **Danger** must be Isolated. **Points of Isolation** must be established
- 6.3 Notices must be displayed on unit and main control panels to the effect that brush gear work is in progress
- 6.4 Temporary insulating screens must be used where necessary to prevent **Danger**.
- 6.5 Floor space in the working area must be clean, safe for work and clear of loose material. The area in which the work is to be done must be demarcated and adequately illuminated
- 6.6 A **Certificate for Live LV Work** must be issued
- 6.7 The **Control Person (Operation)** and, where appropriate, the plant operator must be informed of the issue of the **Certificate for Live LV Work**
- 6.8 The work must be carried out by **Competent Persons**
- 6.9 The **Competent Person** carrying out the work must be accompanied by another **Competent Person** throughout the duration of the work
- 6.10 The **Competent Person** working on the brush gear must stand on an **Approved** mat of insulating material, which is free from oil or grease
- 6.11 The **Competent Person** doing the work must wear eye protection and protective clothing that has no loose or frayed ends exposed and has close fitting cuffs
- 6.12 **Approved** insulating gloves must be worn for handling tools whilst working on brushes and connections
- 6.13 All tools must be insulated and **Approved** for the purpose. During use their movement must be restricted such that they cannot fall into the gear
- 6.14 The brush gear should be visually examined before starting work to ensure that the brushes are clean and dry. Where oil or significant carbon deposits are found on the brushes then work cannot proceed, the **Certificate for Live LV Work** must be cleared and cancelled and the work carried out with the machine at rest.
- 6.15 Before any brush is removed from its housing, a check must be made to ensure that the remaining brushes are actually in contact with the sliprings or commutator
- 6.16 If brushes are thought to be away from the contact surface they must be pushed on to that surface using a suitable insulated tool. This ensures that when a brush is removed the remaining brushes can adequately carry the current

- 6.17 Whilst the brushes are being changed the **Competent Person** doing the work must ensure that he does not touch any surrounding metal work. All metal which is electrically bonded to earth in the vicinity of the work must be covered with insulating material as far as is reasonably practicable
- 6.18 Pre-bedded replacement brushes should be used whenever possible in order to minimise the length of time of **Live** working
- 6.19 The accompanying **Competent Person** should contribute towards the implementation of a safe working procedure. He should assist the **Competent Person** carrying out the work to maintain an insulated working environment. He can also give assistance in the event of an emergency.

7 WORK WITH MACHINE ON BARRING GEAR

- 7.1 The following precautions must be taken when work is to be carried out on brush gear with the machine on barring gear
- 7.2 The machine must be **Isolated** from the motive power supply and **Isolated** electrically. **Points of Isolation** must be established
- 7.3 Floor space in the working area must be clean, safe for work and clear of loose material. The area in which the work is to be done must be demarcated and adequately illuminated
- 7.4 A **Permit for Work** must be issued
- 7.5 The work must be carried out by a **Competent Person**
- 7.6 The **Competent Person** doing the work must wear protective clothing that has no loose or frayed ends exposed and has close fitting cuffs
- 7.7 All tools must be insulated and **Approved** for the purpose. During use their movement must be restricted so that they cannot fall into the gear.

8 WORK WITH THE MACHINE ON RUNDOWN FROM LOAD

- 8.1 Work should not be carried out with the machine on rundown from load. Work can only be carried out when the machine is on barring or at rest.